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I, JULIE BILLINGSLEY, TEAM LEADER EXAMINATION SUPPORT AND SALES hereby certify that annexed is a true copy of the Provisional specification in connection with Application No. 2003903852 for a patent by GEORGE WESTON FOODS LIMITED as filed on 25 July 2003.

WITNESS my hand this  
Sixth day of August 2004

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AUSTRALIA

Patents Act 1990

**PROVISIONAL SPECIFICATION**

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**Invention Title:** **Method for the production of food products having reduced fat content**

**The invention is described in the following statement:**

**METHOD FOR THE PRODUCTION OF FOOD PRODUCTS  
HAVING REDUCED FAT CONTENT**

This invention relates to methods for the production of food products having reduced fat content, such as reduced levels of shortening and/or oils or other fats. In another aspect this invention is concerned with food products having reduced levels of fat content. In still further aspects this invention is concerned with puffed snacks and instant noodle snacks, together with methods for their production.

10 Baked goods are typically prepared from wheat flour and fats, for example from 5 to 30% fat, such as shortening and/or oil. The fat content provides a characteristic soft eating quality/textural, and maintenance of shelf life for an extended time period.

15 Hamburger buns are typically prepared from hard wheat flour and high levels (5 to 15%) of shortening and/or oil. The high levels of fat in hamburger buns and other breads are undesirable from a nutritional viewpoint. However, consumers are generally unwilling to sacrifice taste for nutrition.

20 Cakes are typically prepared from soft wheat flour and high levels (from about 10 to about 30%) of shortening and/or oil. Cakes are not generally viewed as nutritious due to their high fat and sugar contents.

25 Puffed pastry is prepared from hard wheat flour and shortening (for example butter), generally in equal amounts. Quality is determined by expansion and lamination, which can be attributed to the combination of a flour and high fat content. Nutritionally, such high fat pastry products are undesirable.

30 US Patent No. 6,042,867 describes flour blends for the production of breads, cakes or noodles which contain various proportions of waxy wheat flour, and food products formed therefrom. In the case of bread, the waxy wheat flour content is 0.5 to 30%. Additionally, the breads contain fats and oils (for example 13% shortening oil). With regard to cakes,

waxy wheat flour content between 1 and 30% are described, together with a content of as much as 90% shortening, such as margarine or butter.

International Patent publication No. WO 200149131 describes cooked waxy wheat food products produced by heating a waxy wheat for 5 to 15 minutes at 200 to 230°C with moisture, gelatinising the heated waxy wheat, and cooling and drying the gelatinised waxy wheat so produced. The waxy wheat is mixed with or coated with oils and fats to produce a food product.

There remains a need for food products which have low fat content, whilst at the same time maintaining eating quality and texture/appearance.

Various baked products containing gums, combination of proteins and gums, and other fat substitutes, have been used in attempts to provide low fat products. However, such additives are expensive, are not suitable in foods which utilise high levels of fat for taste and texture, and may alter product appearance.

It has surprisingly been found by the applicant that waxy wheat flour can replace fat content in food products, such as baked goods either partially or completely, without loss of taste, eating quality texture or appearance of food product.

#### **Summary of the Invention**

The present inventors carried out a series of studies in an attempt to solve the problem of reducing fat content of food products, particularly baked goods such as hamburger buns, cakes and pastry whilst maintaining these products' characteristic eating qualities and textures. It was found by the applicant that the using waxy wheat flour the fat content of baked food products could be replaced, by 20-100% w/w.

The inventors have found that foods such as hamburger buns and cakes prepared from a flour blend prepared from waxy wheat flour provide excellent texture and eating quality and improve nutrition quality of the product. In the case of pastry prepared from waxy

wheat flour, the product showed improved expansion and lift, in the absence of added fat.

In further studies carried out to produce nutritious baked snacks, containing low or no fat and excellent qualities and textures, the present inventors found that ready to consume 5 snack foods can be prepared using waxy wheat flour without any fat addition.

In accordance with the broadest aspect of this invention there is provided a method for the production of food products comprising wheat and/or rye flour and added fat, said method comprising substituting the flour with 0.5-100% w/w of waxy wheat flour, wherein said 10 waxy wheat flour replaces fat content in said food product by 20-100% w/w.

Preferably the baked food product is a bakery item such as bread, rolls, buns such as hamburger buns, cake, pastry such as croissants or brioche, pastry products such as pies, and tarts, puffed snacks, and ready to eat noodle snacks wherein waxy wheat flour in said 15 products replaces fat content.

In accordance with a further aspect of this invention there is provided a method for the production of a ready to consume snack food product comprising the steps of:

- 20 (a) mixing 100 parts of waxy wheat flour, or a blend of waxy wheat flour and wheat flour comprising at least 50% waxy wheat flour with 30-75 parts water to form a dough;
- (b) resting the dough at 15-30°C for 1 minute to about 2 hours; and
- (c) reducing the thickness of the dough to about 1.5-3 mm, cutting the dough to a thickness between about 1.5-3 mm into a plurality of snack pieces, and contacting the snack pieces with steam for about 2-3.5 minutes and/or baking the snack pieces at 130-190°C for about 3-9 minutes, so as to give an expanded, high gloss snack food product; or
- 25 (d) spreading a thin layer of dough onto a heated plate at 180°C to 220°C for 80-140 seconds to give an expanded wafer.

**Detailed Description of the Invention**

In the present invention waxy wheat flour refers to wheat flour with an amylase content of less than 5%.

- 5 In accordance with the broadest aspect of this invention there is provided a method for the production of food products comprising wheat and/or rye flour and added fat, said method comprising substituting the flour with 0.5-100% w/w of waxy wheat flour, wherein said waxy wheat flour replaces fat content in said food product by 20-100% w/w.
- 10 Preferably the baked food product is a bakery item such as bread, rolls, buns such as hamburger buns, cake, pastry such as croissants or brioche, pastry products such as pies, and tarts, puffed snacks, and ready to eat noodle snacks wherein waxy wheat flour in said products replaces fat content.
- 15 The content of the waxy wheat flour in the food products of the present invention may differ according to end use. Waxy wheat flour content is between 0.5 and 100% flour content, more preferably from 0.5-50% flour content, or in other embodiments from 70-100% flour content.
- 20 The content of waxy flour in instant noodle snacks is generally 70-100% of flour content, with a non-waxy flour when present preferably being hard wheat flour and/or waxy maize starch. In another embodiment, non-waxy wheat flour may be replaced with mashed potato or other starch material.
- 25 The content of waxy flour in the preparation of bread and buns, such as hamburger buns, is generally in the amount of 0.5-50% by weight of flour content, more preferably between 1-10% flour content, with the remaining flour generally being hard wheat flour.
- 30 The content of waxy wheat flour in the preparation of cakes is generally in the amount of 0.5-50% by weight of flour content, more preferably between 1-20% with the remaining flour content generally being soft wheat flour.

The waxy wheat flour content in pastry is generally in the amount between about 0.5-50% by weight, more preferably 1-30% by weight flour content, with the remaining flour content generally being hard wheat flour.

5

In accordance with a further aspect of this invention there is provided a method for the production of a ready to consume snack food product comprising the steps of:

- 10 (a) mixing 100 parts of waxy wheat flour, or a blend of waxy wheat flour and wheat flour comprising at least 50% waxy wheat flour with 30-75 parts water to form a dough;
- (b) resting the dough at 15-30°C for 1 minute to about 2 hours; and
- (c) reducing the thickness of the dough to about 1.5-3 mm, cutting the dough to a thickness between about 1.5-3 mm into a plurality of snack pieces, and contacting the snack pieces with steam for about 2-3.5 minutes or baking the snack pieces at 130-190°C for about 3-9 minutes, so as to give an expanded, high gloss snack food product; or
- 15 (d) spreading a thin layer of dough onto a heated plate at 180°C to 220°C for 80-140 seconds to give an expanded wafer.

20

The content of waxy wheat flour in ready to consume snack foods, such as puffed snacks, is generally in the order of about 50-100% by weight flour content, more preferably 70-100% by weight flour content with the remaining flour being hard wheat flour, soft wheat flour, rye flour, rice flour, mashed potato or other starch material or mixtures thereof.

25

As mentioned above, the inventors have surprisingly found that waxy wheat flour can replace fat content in food products such as baked goods, either partially or completely, without loss of taste, eating quality, texture or appearance of food product. The inventors have found that nutritional food products of excellent eating quality and textures are found 30 in products containing waxy wheat in place of a proportion of wheat flour.

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Instant noodle snacks prepared from waxy wheat flour have been found to produce a good quality noodle with a shiny surface and very crisp texture. Normal wheat flour blended with maize starch produces a low quality product with poor appearance and crispness.

5 In the case of puffed snacks, products prepared from waxy wheat flour had a unique appearance, good expansion and crisp texture.

In the case of wafers, products prepared from waxy wheat flour were crispy, had increased spread and decreased cook time.

10 Food products may contain small amounts of salt or other flavouring components such as chicken stock or other stocks, yeast improvers, yeast, sugar and/or gluten. Other minor amounts of components may include humectants, whey powders, gums, colour at levels less than 1%, artificial flavours, baking powders and preservatives, as well as other 15 components well known in the manufacture of food products containing flour.

Embodiments of this invention will now be described with reference to the following non-limiting examples:

20 **Example 1**

Instant noodle snack

The materials listed in table 1 were used to prepare instant noodle snacks.

Table 1: Instant Noodle Snack Formulation

Ingredient	Control	Waxy Wheat Flour Test
Flour	80	0
Waxy Wheat flour	0	100
Waxy Maize starch	20	0
Flavour	1.0	1.0
Na <sub>2</sub> CO <sub>3</sub>	0.2	0.2
Water	34	34
Oil	4	4

The processing for instant noodle snacks is as follows:

1. Dough Mixing
2. 1 minute dry mixing at low speed
- 5 3. 1 minute dough mixing at low speed
4. 1 minute dough mixing at high speed
5. 3 minutes dough mixing at low speed
6. Dough sheet resting (23°C for 30mins)
7. Dough sheet reduction (3mm-2.2mm-1.5mm)
- 10 8. Noodle cutter (#20 cutter)
9. Steaming (100°C, 3min)
10. Baking (160°C, 3.5min)

**Example 2**

**15 Puffed snacks**

Waxy wheat flour produced a good quality instant noodle snack with a golden shiny surface and very crisp texture. Normal wheat flour combined with maize starch produced a low quality product with poor appearance and crispiness.

20 Of the dry ingredient blends used in the preparation of puffed snacks, blends contained waxy wheat flour in an amount between 70-100% by weight, with the remaining parts being instant mashed potato.

The materials listed in table 2 were used to prepare puffed snacks.

25

Table 2: Puffed Snack Formulation

Ingredient	Control	Waxy Wheat Flour Test
Flour	75	
Waxy Wheat flour	0	X
Instant mashed potato	25	100-X
Flavour	1.0	1.0
Water	30-75	30-75

The processing for instant noodle snacks is as follows:

1. Dough Mixing
2. Dough sheet resting (23°C for 30 mins)
- 5 3. Dough sheet reduction (3mm-2.2mm-1.5mm)
4. Cutting
5. Steaming (100°C 3 min)
6. Drying (23°C for 24 hr)
7. Baking (180°C, 7.5 min)

10

Puffed snacks had a unique appearance and crisp texture.

15 Of the dry ingredient blends used in the preparation of microwavable puffed snacks, blends contained waxy wheat flour in an amount between 70 – 100% by weight, with the remaining parts being instant mashed potato.

The materials listed in table 3 were used to prepare microwavable puffed snacks.

Table 3: Microwavable Puffed Snack Formulation

Ingredient	Control	Waxy Wheat Flour Test
Flour	75	
Waxy Wheat flour	0	X
Instant mashed potato	25	100-X
Flavour	1.0	1.0
Water	30-75	30-75

20

The processing for instant noodle snacks is as follows:

1. Dough Mixing
2. Dough sheet resting (23°C for 30 mins)
3. Dough sheet reduction (3mm-2.2mm-1.5mm)
- 25 4. Cutting
5. Steaming (100°C 3 min)
6. Puffing (approximately 20 sec at cooking level)

Microwave puffed snacks had a unique appearance and crisp texture.

**Example 3**

**5 Wafers**

Of the dry ingredient blends used in the preparation of wafers, blends contained waxy wheat flour in an amount between 50-100% by weight, with the remaining parts being normal wheat flour.

**10 The materials listed in table 4 were used to prepare wafers.**

**Table 4: Wafer Formulation**

Ingredient	Control	Waxy Wheat Flour Test
Flour	100	100-X
Waxy Wheat flour	0	X
Sodium bicarbonate	0.5	0.5
Salt	0.5	0.5
Lecithin	0.1	0.1
Flavour	1.0	1.0
Water	30-75	30-75

The processing for instant noodle snacks is as follows:

**15**

1. Mixing all ingredients into batter
2. Stand for 1 minute
3. Spoon batter onto Roti maker
4. Cook (214°C for 100 secs turning every 20 seconds)

**20 The following observations were made**

Observation	Control	Waxy Wheat flour Test
Diameter (cm)	10-10.5	11-11.5
Cook Time (secs)	120	100
Texture	Hard	Crisp
Bite	Some parts are soggy, some parts are crunchy	Light and crunchy

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#### **Example 4**

##### **Hamburger bun**

The materials listed in table 1 were used to prepare hamburger buns.

5

**Table 5: Hamburger Bun Formulation**

Ingredient	Control	Waxy wheat flour
Flour	100	100-X
Salt	1.5-2.5	1.5-2.5
Water	50-75	50-75
Improver	0-5	0-5
Yeast	As required	As required
Gluten	0-8	0-8
Sugar	5-15	5-15
Soya flour	0-2	0-2
Fat/Oil	2-12	1-9.6
Waxy Wheat flour		X
Fibre		0-8

##### **Production Method**

##### **No Time Dough**

1. Mixing low speed 2 minutes, high speed 8 minutes

10 2. Final dough temperature 28-32°C

3. Intermediate proof (3 minutes)

4. Make up (Scale 50-120g, Sheet 6-12mm)

5. Final proof (38°C, RH 85%, 30-120 minutes)

6. Bake (180-210°C, 10-20 minutes)

15

The amount of added fat required for an excellent taste, texture and quality bun was significantly reduced.

**Example 5****Cakes**

Of the flour blends used in the preparation of cakes, blends contained waxy wheat flour in an amount between 0.5-50% by weight, more preferably between 1-20% with the 5 remaining parts being soft wheat flour.

The materials listed in table 6 were used to prepare cakes.

Table 6: Madeira cake Formulation

Ingredient	Control (%)	Waxy Wheat Flour Test (%)
Sugar	24	24
Fat	12	5-10
Humectant	5.3	5.3
Labwhip	1	1
Salt	0.7	0.7
Whey Powder	1.7	1.7
Gum	0.03	0.03
Water	1.6	1.6
Colour (1%)	0.05	0.05
Flavour	0.01	0.01
Egg Pulp	11.3	11.3
Flour	24.9	24.9
Baking Powder	0.6	0.6
Preservative	1.7	1.7
Wheat Starch	0.03	0.03
Waxy Wheat Flour		X

10

Process for making a Madeira cake is as follows:

1. Blend all dry ingredients
2. Mix with wet ingredients on slow speed for 2 minutes.
3. Beat on high speed 6 minutes to obtain uniform batter of SG 1.3-1.6
4. The batter is placed in a cake pan and baked at 160°C for 105minutes.

15

The cake was then stored at 3-4°C and at room temperature and compared at 1, 2 and 5 weeks. Panelists in terms of its texture evaluated the cake. The results were that control

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cakes were generally found to be firmer and dryer than cakes with waxy wheat flour. At 2 weeks panelists gave the following comments.

Table 7: Panelists Comments at 2 weeks storage

Control	Waxy Wheat Flour
Dry	Fresher softer eating
Dry	More moist
Least preferred	Really moist
Dry	Gluier
Drier – sugar crystals	Prefer, less dry Not much difference

5

### Example 6

#### Pastry

Of the flour blends used in the preparation of pastry, blends contained waxy wheat flour in an amount between 0.5 – 50% by weight, more preferably between 1-30% with the remaining parts being hard wheat flour.

The materials listed in table 4 were used to prepare pastry

Table 8: Puff Pastry Formulation

Ingredient	Control	Waxy Wheat Flour
Maximus Flour	100	100-X
Salt	1	1
Water	47.5	48.8
Waxy Flour		X
Margarine	50	50

15

Processing was the same for all formulations

1. Mix flour salt and water to form dough the same consistency as margarine
2. Mix 4 minutes slow, 2 minutes fast
3. Allow dough to rest 20 minutes
- 20 4. Flatten out dough, place margarine evenly on top
5. 2 half folds
6. 10 minute rest

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7. 2 half folds
8. 5 minute rest
9. Roll out
10. Cut into match squares
- 5 11. Bake at 220°C for 13 minutes

Product was then evaluated in terms of lift and expansion with the following results.

Table 9: Final Product Quality

	Control	Waxy Wheat Flour
Match sheets unbaked (cm)	12.4 * 6.0	12.4 * 6.0
Match sheets baked (cm)	11.2 * 4.6	11.2 * 4.6
Height (mm)	14	21

10

Pastry using waxy wheat flour showed good lift and expansion compared to the control.

Throughout this specification and the claims which follow, unless the context requires otherwise, the word "comprise", or variations such as "comprises" or "comprising", will be 15 understood to imply the inclusion of a stated integer or step or group of integers or steps but not the exclusion of any other integer or step or group of integers or steps.

The reference to any prior art in this specification is not, and should not be taken as an acknowledgment or any form of suggestion that that prior art forms part of the common 20 general knowledge in Australia.

**Claims**

1. A method for the production of food products comprising wheat and/or rye flour and added fat, said method comprising substituting the flour with 0.5-100% w/w of waxy wheat flour, wherein said waxy wheat flour replaces fat content in said food product by 20-100% w/w.  
5
2. A method according to claim 1 wherein said food products are selected from bread, rolls, buns such as hamburger buns, cake, pastry such as croissants or brioche, 10 pastry products such as pies, and tarts, puffed snacks, and ready to eat noodle snacks wherein waxy wheat flour in said products replaces fat content.
3. A method according to claim 1 or 2 which is a method for the production of an instant noodle snack food product wherein 70-100% of flour content is waxy wheat 15 flour.  
15
4. A method according to claim 1 or 2 which is a method for the production of bread and buns, such as hamburger buns, wherein 0.5-50% of flour content is waxy wheat flour.  
20
5. A method according to claim 1 or 2 which is a method for the production of a pastry food product wherein 0.5-50% of flour content is replaced with waxy wheat flour.  
25
6. A method for the production of a ready to consume snack food product comprising the steps of:
  - (a) mixing 100 parts of waxy wheat flour, or a blend of waxy wheat flour and wheat flour comprising at least 50% waxy wheat flour with 30-75 parts water to form a dough;  
30
  - (b) resting the dough at 15-30°C for 1 minute to about 2 hours; and

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5 (c) reducing the thickness of the dough to about 1.5-3 mm, cutting the dough to a thickness between about 1.5-3 mm into a plurality of snack pieces, and contacting the snack pieces with steam for about 2-3.5 minutes and/or baking the snack pieces at 130-190°C for about 3-9 minutes, so as to give an expanded, high gloss snack food product; or

(d) spreading a thin layer of dough onto a heated plate at 180°C to 220°C for 80-140 seconds to give an expanded wafer.

10 DATED this 25th day of July, 2003.

**George Weston Foods Limited**

By Its Patent Attorneys

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